1. Question Details

If \( \vec{r}(t) \) represents the position of an object at time \( t \), then \( \vec{v}(t) = \vec{r}'(t) \) represents the object's velocity, \( |\vec{v}(t)| \) represents the object's speed, and \( \vec{a}(t) = \vec{r}''(t) \) represents the object's acceleration.

Suppose \( \vec{r}(t) = (100t, 10 + 50t - 16t^2) \).

Compute the velocity as a function of time.

\[ \vec{v}(t) = \] 

Compute the speed as a function of time.

\[ |\vec{v}(t)| = \] 

Compute the acceleration as a function of time.

\[ \vec{a}(t) = \] 

2. Question Details

Suppose the position of a moving object is given by

\[ \vec{r}(t) = (te^{-t}, t^2 - 2). \]

Compute the velocity at the instant \( t = 1 \).

\[ \vec{v}(1) = \] 

Compute the speed at the instant \( t = 1 \).

\[ |\vec{v}(1)| = \] 

Compute the acceleration at the instant \( t = 1 \).

\[ \vec{a}(1) = \]
3. Question Details

Download and complete Worksheet #3. If you are working in class, get a copy from your instructor. After you complete the worksheet, fill in these answers:

\[ \vec{v}(t) = \]

| \[ |\vec{v}(t)| = \]

, fully simplified!

\[ \vec{a}(t) = \]

What is the acceleration at the instant the object passes through the origin?

\[ \vec{a} = \]

4. Question Details

The velocity of a moving object is given by

\[ \vec{v}(t) = (t - 2, 2t). \]

Find the vector valued function that gives the position of the object at time \( t \) if the initial position of the object was \( \vec{r}(0) = (1, 2) \).

\[ \vec{r}(t) = \]

5. Question Details

The acceleration of a moving object is given by

\[ \vec{a}(t) = (6t, \sin(t)). \]

Find the vector valued function that gives the velocity of the object at time \( t \) if the initial velocity of the object was \( \vec{v}(0) = (0, 0) \).

**Note:** Acceleration is the derivative of velocity: \( \vec{a} = \vec{v}' \)

\[ \vec{v}(t) = \]

Now find the position function, assuming that \( \vec{r}(0) = (4, 0) \).

\[ \vec{r}(t) = \]
The acceleration of a moving object is given by
\[ \mathbf{a}(t) = (2, -2e^{-2t}) \]

Initial velocity and position are
\[ \mathbf{v}(0) = (2, 0), \quad \text{and} \]
\[ \mathbf{r}(0) = (0, 0) \]

Find the position function.
\[ \mathbf{r}(t) = \boxed{\text{[Formula here]}} \]